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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/964,194	09/26/2001	Michael L. Myrick	16139 / 09014	1293
27530	7590	09/22/2005	EXAMINER	
NELSON MULLINS RILEY & SCARBOROUGH, LLP 1320 MAIN STREET, 17TH FLOOR COLUMBIA, SC 29201			MARKHAM, WESLEY D	
			ART UNIT	PAPER NUMBER
			1762	

DATE MAILED: 09/22/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/964,194

Applicant(s)

MYRICK ET AL.

Examiner

Wesley D. Markham

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-24 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1-24 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 May 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 8/12/2002.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Response to Amendment

1. Acknowledgement is made of the amendment filed by the applicant on 7/5/2005 inserting a notification of government rights into the specification. **Claims 1 – 24** are currently pending in U.S. Application No. 09/964,194, and an Office action on the merits follows.

Priority

2. Applicant's claim for the benefit of a prior-filed application under 35 U.S.C. 119(e) is acknowledged. Applicant has not complied with one or more conditions for receiving the benefit of an earlier filing date under 35 U.S.C. 119(e) as follows: The later-filed application (i.e., 09/964,194) must be an application for a patent for an invention which is also disclosed in the prior application (the parent or original nonprovisional application or provisional application). The disclosure of the invention in the parent application and in the later-filed application must be sufficient to comply with the requirements of the first paragraph of 35 U.S.C. 112. See *Transco Products, Inc. v. Performance Contracting, Inc.*, 38 F.3d 551, 32 USPQ2d 1077 (Fed. Cir. 1994). In this case, the disclosure of the prior-filed application, Application No. 60/235,336, fails to provide adequate support or enablement in the manner provided by the first paragraph of 35 U.S.C. 112 for one or more claims of this application. Specifically, the examiner has reviewed provisional Application No. 60/235,336 (filed on 9/26/2000) and notes that the process claimed in Claims 1 – 24 of the instant

application is not adequately supported and enabled by provisional Application No. 60/235,336. For example, provisional Application No. 60/235,336 does not support or enable the steps of providing sample spectra and measurements of a predetermined characteristic associated with the sample spectra, selecting an initial number of layers, selecting a thickness for each layer, defining a first regression formula that relates interaction of light with the transmission spectrum to a regression value, applying each sample spectrum to the regression formula, thereby determining the regression value for each sample spectrum, defining a comparison relationship between the regression values and said measurements, and optimizing the comparison relationship for said regression values, wherein thickness of each layer is an optimization variable, as recited in independent Claims 1, 20, and 24; actually forming an optical filter segment in the manner required by Claims 11 – 19, 23, and 24; or selecting a plurality of sets of initial conditions, selecting a group of layer thicknesses, and determining a second regression formula as required by Claims 9, 10, 21, and 22. As such, the effective filing date of Claims 1 – 24 of the instant application is 9/26/2001 (i.e., the actual filing date of the application).

Information Disclosure Statement

3. The IDS filed by the applicant on 8/12/2002 is acknowledged by the examiner and the references listed thereon have been considered as indicated on the attached copy of the PTO-1449 form.

Drawings

4. The formal drawings (7 sheets, 11 figures) filed by the applicant on 5/20/2002 are acknowledged and approved by the examiner.

Specification

5. The lengthy specification (41 pages, excluding the claims) has not been checked to the extent necessary to determine the presence of all possible minor errors.

Applicant's cooperation is requested in correcting any errors of which applicant may become aware in the specification.

Claim Rejections - 35 USC § 112

6. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7. Claims 2, 3, 16, and 20 – 24 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.
8. **Claim 2**, from which **Claim 3** depends, requires, in part, "the difference between said light transmitted by said transmission spectrum and said light reflected by said transmission spectrum". This limitation renders the scope of Claims 2 and 3 unclear because it is unclear how light can be either transmitted or reflected "by said transmission spectrum", as a spectrum of light is simply a graphical / visual

representation of how light interacts with a given medium (i.e., a spectrum itself does not reflect or transmit light – it simply depicts what wavelengths of light are transmitted and/or reflected by a given medium).

9. **Claim 3** requires that “S is the spectrum of said light”. However, Claims 1 and 2 (from which Claim 3 depends) refer to several different spectra, i.e., a transmission spectrum and a plurality of sample spectra. Therefore, it is unclear what spectrum “the spectrum of said light” in Claim 3 refers to, and the scope of the claim is vague and indefinite.
10. **Claim 16** requires, in part, “following step (o), repeating steps (i) – (n)...” However, neither Claim 16 nor any of the claims from which Claim 16 directly or indirectly depends previously recites a step (o). Therefore, it is unclear how steps (i) – (n) can be repeated after step (o) when step (o) is not defined or described by the claim (i.e., it is unclear at what time period in the process steps (i) – (n) must be repeated in order to be repeated “following step (o)”).
11. **Claim 20** (from which **Claims 21 – 23** depend) and **Claim 24** both require “optimizing said comparison relationship for said regression values to a minimum said comparison value”. It is unclear what the applicant intends to claim by reciting “a minimum said comparison value”.
12. **Claim 23** requires, in part, “based on said transmission spectrum determined at set (I)”. This limitation renders the scope of Claim 23 unclear because it implies that a transmission spectrum has been determined at “set (I)”, but “set (I)” has not previously been discussed or defined by the claim.

13. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

14. **Claims 1 – 24** are rejected under 35 U.S.C. 112, first paragraph, because the

specification, while being enabling for a specific method of determining layer thicknesses within a method of making an optical interference filter, does not reasonably provide enablement for the broadly claimed method of Claims 1 – 24.

The specification does not enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to use the invention commensurate in scope with these claims. Specifically, Claims 1 – 24 are generally drawn to a method of determining layer thicknesses within a method of making an optical interference filter having thin layers of alternately high and low indices of refraction. The specific steps of the algorithm used to determine the thickness(es) of the optical filter layers are recited broadly, and the specification does not enable one skilled in the art to carry out a method commensurate in scope with the method required by Claims 1 – 24 without undue experimentation. For example: (1) the claims are open to any “sample spectra” and any “predetermined characteristic” measurements, but the applicant’s disclosure is limited to sample spectra of gasoline samples and octane value measurements; (2) the claims are open to any method of “determining a transmission spectrum”, but the applicant’s disclosure is limited to using a specific

matrix method to determine the transmission spectrum (see pages 5 – 8 and 13 of the specification); (3) the claims are open to any method of “defining” a regression formula, but the applicant’s disclosure is limited to using a specific method to define a specific regression formula (see pages 14 – 17 of the specification); (4) the claims are open to any method of “defining a comparison relationship” between regression values and measurements, by the applicant’s disclosure is limited to doing so by using a specific merit function (pages 17 – 18 of the specification); and (5) the claims are open to any method of “optimizing said comparison relationship” for the regression values, but the applicant’s disclosure is limited to doing so by a specific method (i.e., a quasi-Newton root mean square minimization procedure) (pages 18 – 20 of the specification). Therefore, one skilled in the art would not have been able to practice a process commensurate in scope with the claimed method without undue experimentation.

Claim Rejections - 35 USC § 102

15. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

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16. Claims 1, 2, 4 – 6, 8, 11 – 13, 20, and 23 are rejected under 35 U.S.C. 102(a) as being anticipated by Soyemi et al. ("Design and Testing of a Multivariate Optical Element", Anal. Chem., 2/10/2001).
17. Regarding independent **Claims 1 and 20**, Soyemi et al. teaches a method of determining layer thicknesses within a method of making an optical interference filter (Abstract), the method comprising the steps of providing sample spectra and measurements of a predetermined characteristic associated with the respective sample spectra (page 1070); selecting a substrate, an initial number of layers, a material with which to make each layer, and a thickness for each layer (Abstract, Table 1, page 1074); determining a transmission spectrum of an optical filter having said number of layers and thickness, defining a first regression formula that relates an interaction of light with the transmission spectrum to a regression value, applying each sample spectrum to the regression formula, thereby determining the regression value for each of the sample spectrum, defining a comparison relationship between the regression values and the measurements, and optimizing the comparison relationship using layer thickness as an optimization variable (pages 1070 – 1077, which describes the spectral matching / PCR vector / nonlinear squares optimization process used to produce the final filter design claimed by the applicant). Regarding **Claims 2 and 4 – 6**, Soyemi et al. teaches the claimed use of a regression formula and quasi-Newton RMS optimization (page 1070, col.2; pages 1073 – 1076). Regarding **Claim 8**, Soyemi et al. also teaches that the optimizing step eliminates any layer for which the thickness is below a predetermined level during optimization

(page 1075, col.1). Regarding **Claims 11 – 13 and 23**, Soyemi et al. also teaches the claimed method of actually forming an optical filter segment based on the predetermined filter design (pages 1071, 1074, and 1076).

Claim Rejections - 35 USC § 103

18. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

19. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

20. Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Soyemi et al. in view of Soyemi et al.(2) ("Novel Filter Design Algorithm for Multivariate Optical Computing, Proceedings of SPIE, Feb.2001).

21. Soyemi et al. teaches all the limitations of **Claim 3** as set forth above in paragraph 17, except for the specific form of the regression formula. However, Soyemi et al.(2) teaches that the regression formula claimed by the applicant is used in a process of optimizing filter layers analogous to that of Soyemi et al. (pages 291 – 292). Therefore, it would have been obvious to one of ordinary skill in the art to utilize the specific regression formula taught by Soyemi et al.(2) as the regression formula of Soyemi et al. because doing so would be expected to achieve the results desired by Soyemi et al. (i.e., mathematically optimizing the thickness of the layers in a multi-layer optical interference filter).
22. Claims 7 and 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Soyemi et al. in view of Perilloux (USPN 4,793,669).
23. Soyemi et al. teaches all the limitations of **Claims 7 and 14** as set forth above in paragraph 17, except for repeating the optimization and deposition step(s) until the values fall within a “tolerance level” or “threshold”. However, Perilloux teaches that, in the art of manufacturing a multilayer optical filter, each layer’s thickness must be within a specific tolerance of the optimum thickness in order to insure that the filter is conveniently and repeatably manufactured and that any small variations in each layer’s thickness will not significantly alter the filter’s spectral curve (Col.6, lines 41 – 64). Therefore, it would have been obvious to one of ordinary skill in the art to perform the optimization and deposition step(s) of Soyemi et al. until the calculated and/or measured values fall within a specific “tolerance level” or “threshold” in order

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to insure that the filter can be conveniently and repeatably manufactured to have a spectral curve as close to the predetermined optimal spectral curve as possible (e.g., so that the actual filter matches the filter design specifications as closely as possible, and the filter design specifications are as accurate as possible).

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Trost et al. (USPN 5,296,961), Southwell (USPN 4,536,063), Perilloux et al. (USPN 4,896,928), Southwell (USPN 4,666,250), and Laird et al. (USPN 6,074,730) all teach various methods of optimizing an optical filter design (number of layers, thickness of each layer) by minimizing merit function values.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Wesley D. Markham whose telephone number is (571) 272-1422. The examiner can normally be reached on Monday - Friday, 8:00 AM to 4:30 PM.

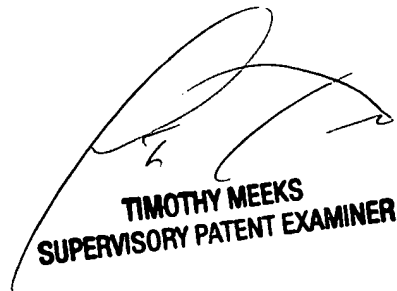
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Meeks can be reached on (571) 272-1423. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



WDM

Wesley D Markham
Examiner
Art Unit 1762



TIMOTHY MEES
SUPERVISORY PATENT EXAMINER